



Original communication

Accuracy in certification of cause of death in a tertiary care hospital – A retrospective analysis

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ABSTRACT

Every physician is duty bound to issue a “Cause of Death” certificate in the unfortunate event death of his/her patient. Incomplete and inaccurate entry in these certificates poses difficulty in obtaining reliable information pertaining to causes of mortality, leads to faulty public health surveillance, and causes hindrance in research. This study intends to evaluate the completeness and accuracy of Medical Certification of Cause of Death in our Institute and to formulate strategy to improve the quality of reporting of cause of death. During the period from January 2012 to December 2012, a total of 151 certificates of cause of death were issued by the faculty members of various departments. Maximum number of death certificates were issued for patients in the extremes of the age <10 years ($n = 42$, 27.82%) and in >60 years ($n = 46$, 30.46%). The various inadequacies observed by us are as follows: 40 (26.49%) cases had inaccurate cause of death, interval between onset and terminal event was missing in 94 (62.25%) cases, in 68 (45.03%) cases the seal with registration number of the physician was not available on the certificate, incomplete antecedent & underlying cause of death was found in 35 (23.18%) & 84 (55.63%) cases, in 66 (43.71%) cases there was use of abbreviations and the handwriting was illegible in 79 (52.32%) cases.

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1. Introduction

Birth and death are the two most important events in the life of an individual. A person's existence commenced with birth and ceases with demise. A person has a legal existence between the recorded timings of birth and death.¹ A death certificate, or more appropriately a certificate for the registration of the medical cause of death is a document that enables the family of the deceased to register death. It also provides a measure of the relative contributions of different diseases to mortality which is vital for public health surveillance and for facilitating a wide range of research.² Reliable information on deaths and their causes are vital for decision-makers as they provide information on the current health situation and allow monitoring the trends of the overall burden of diseases. Both the magnitude and distribution of disease burden are

crucial to formulate policies, enable resource allocation for better addressing the health needs, and monitor the impact of health interventions on health outcomes.³ The data on the cause of death mentioned in the death certificates serve many purposes, such as assessment of the effectiveness of public health programs, providing a feedback for future policy and its implementation, improved health planning and management, and deciding the priorities of health and medical research programmes.⁴ Accuracy in certifying the cause of death is desirable at many levels—for the office of Population and Census Studies to provide reliable information to health planners, for families in understanding their inherited risks, and for individual doctors in preparing their performance review data.⁵ The Medical certification of cause of death [MCCD] scheme which is (basically) a part of International Statistical Classification of Diseases [ICD] and health related problems formulated by WHO is introduced to permit systematic recording, analysis, interpretation and comparison of morbidity and mortality data collected in different countries or areas at different times.⁴ Still, death certification continues to be poorly performed despite different recommendations and increased education at undergraduate and post graduate levels. There are multitude of reasons for inaccuracies in certification which include diagnostic errors,

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omissions, coding errors, death before completion of medical work up, unavailability of medical records, misunderstanding of certification process, and complexity of sorting out causal sequence that led to death when multiple diseases are involved.⁶ The cause of death includes any disease or injury responsible to initiate a chain of events incompatible with life resulting in death of a person.⁷

This study intends to evaluate the completeness and accuracy of Medical Certification of Cause of Death in our institution and to suggest necessary corrective measures to improve the completeness and accuracy of filling of MCCD form with the goal to improve the overall quality of Medical Certification of Cause of death.

2. Materials and methods

This retrospective study was carried out in Kalinga Institute of Medical Sciences, a tertiary care teaching institute in Bhubaneswar. The case records of patients who had expired from January 2012 to December 2012 along with the attached death certificate were retrieved from the Medial Record Department (MRD). The standard format used for medical certification of cause of death for hospital in- patient deaths confirms to the rules made by the Indian Government. Form No. 4 (Fig. 1).⁴ The data regarding the demographic profile of the patients, date of admission and death, duration

between the onset of disease process and the terminal event, use of abbreviations and illegible writing in the certificates, and immediate, antecedent, and contributing causes of death were collected on a proforma. The data entry and analysis was done by using statistical package SPSS version 17. The final data is summarized into percentages and analyzed by cross tabulations for various variables.

3. Result

A total of 151 case records along with the attached death certificates were evaluated for this study. Maximum numbers of certificates were issued to patients in the extremes of ages. The age group of less than 10 years constituted 42 (27.82%) cases while 46 (30.46%) cases fell in the greater than 60 years age group (Table 1). In terms of sex distribution 60.26% of those who died were males and 39.74% were females. The preliminary component of the death certificate such as full name of the deceased was mentioned correctly in all the certificates. However, in four (2.65%) certificates, the gender of the patient was missing and in eight (5.30%), the age of the deceased was not mentioned. Interval between the onset and terminal event of various conditions was mentioned in 57 (37.75%) cases.

FORM NO. 4
(See Rule 7)
MEDICAL CERTIFICATION OF CAUSE OF DEATH
(Hospital in-patients. Not to be used for still births)
To be sent to Registrar along with Form No.2 (Death Report)

Name of the Hospital I hereby certify that the person whose particulars are given below died in the hospital in Ward No on at A.M./P.M.

NAME OF DECEASED					For use of Statistical Office
Sex	Age at Death				
	If 1 year or more, age in Years	If less than 1 year, age in Months	If less than one month, age in Days	If less than one day, age in Hours	
1. Male					
2. Female					
CAUSE OF DEATH					Interval between onset & death approx.
I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.					
(a) Due to (or as a consequences of)					
Antecedent cause Morbidity conditions, if any, giving rise to the above Cause, stating underlying conditions last					
(b) Due to (or as a consequences of)					
(c)					
II Other significant conditions contributing to the death but not related to the disease or conditions causing it					

Manner of Death How did the injury occur ?
1. Natural 2. Accident 3. Suicide 4. Homicide
5. Pending investigation

If deceased was a female, was the death associated with pregnancy ? 1. Yes 2. No
If yes, was there a delivery ? 1. Yes 2. No

Name and signature of the Medical Attendant certifying the cause of death
Date of certification

SEE REVERSE FOR INSTRUCTIONS
(To be detached and handed over to the relative of the deceased)

Certified that Shri/Smt./Kum. SW/D of Shri
..... R/O Was admitted to this
hospital on and expired on

Doctor
(Medical Supdt. & Name of Hospital)

Fig. 1. Standard format used for medical certification of cause of death for hospital in- patient deaths.

Table 1
Frequency of age group with cause of death ($n = 151$).

Age group	No. of death certificate	COD	
		Correct	Incorrect
<1 year	38(25.17%)	33	05
1–10 years	04(2.65%)	03	01
10–20 years	07(4.63%)	06	01
20–40 years	15(9.93%)	10	05
40–60 years	33(21.86%)	21	12
>60 years	46(30.46%)	32	14
Age not Mentioned	08(5.30%)	06	02

The certificate for death has specific columns for signature, full name & designation of the certifying medical practitioner, date of certification, and space for stamp of the certifying person bearing the medical registration number at the bottom of the certificate. In our analysis, we found that though all the certificates bore the signature of the certifying person, only 83 (54.97%) certificates had the seal with registration number of the physician (Table 2). Immediate cause of death was mentioned in all the certificates. However, inaccurate terminology was used for indicating the cause of death in 40 (26.49%) of them. These include various inappropriate terms to describe the mode of death such as cardiac arrest, cardiac shock, sudden cardiac failure, sepsis, respiratory failure, respiratory paralysis, and respiratory arrest (Table 3). There was incomplete filling of the antecedent cause of death and the underlying cause of death in 35 (23.18%) and 84 (55.63%) cases respectively (Table 4). During the evaluation it was also observed that in 66 (43.71%) cases, abbreviations were used to indicate medical terminologies and the handwriting was illegible in 79 (52.32%) cases (Table 5).

4. Discussion

Correct reporting and registration of the cause of death play a very important role in proper health program planning and delivery of health care. We have observed that the death rate was high (27.82%) among the pediatric population of <10 years which correlates well with the study by Raje⁸ & Wilkins.⁹ This high death rate may be explained by the fact that the hospital caters to a large section of population who are underprivileged with inadequate access to basic health facilities, and being a tertiary care hospital the patients are often referred to our center in critical condition. Our study also highlighted that numerous inaccurate terms were used to describe the immediate cause of death (26.49%) which coincides with the study by Swift¹⁰ where 55% of the certificate were completed logically while 24.8% contained incomplete data. The study by Carter et al.¹¹ also indicates that in 63% of deaths the cause of death originally tabulated on immediate cause was the same as the final underlying cause of death. Time interval between the onset and terminal event of various conditions was recorded in 37.75% cases which echo with the study by Agarwal et al.¹² They reported the mention of this time interval in 37% cases. The possible

Table 2
Accuracy in filling the variables.

Total number of cases studied ($n = 151$)		Correctly filled	Incorrectly filled
Age		143(94.70%)	08(5.30%)
Sex		147(97.35%)	04(2.65%)
Male-91(60.26%)	Female 56(39.74%)		
Date & time of death		151(100%)	0
Immediate cause of death mentioned		111(73.51%)	40(26.49%)
Interval between onset and terminal event		57(37.75%)	94(62.25%)
Seal of the doctor with registration no.		83(54.97%)	68(45.03%)

Table 3
Inaccurate description of mode of death as immediate cause of death.

Cause of death	No. of cases	Percentage ($n = 151$)
Cardiac arrest/cardio respiratory failure	15	9.93%
Shock	07	4.64%
Sepsis/septicemia	18	11.92%
Total	40	26.49%

Table 4
Cause of death as filled by the doctor ($n = 151$).

Immediate		Antecedent		Underlying	
Correctly filled	Incorrectly filled	Correctly filled	Incorrectly filled	Correctly filled	Incorrectly filled
111 (73.51%)	40 (26.49%)	116 (76.82%)	35 (23.18%)	67 (44.37%)	84 (55.63%)

explanation for missing out the time interval in a high number of certificates is that being a tertiary health center, we mostly deal with cases that are either referred from primary health centers or other hospitals after the patient has received some form of treatment. Thus, the onset of the said terminal illness many a times becomes blurred. In many instances, the patients are admitted in the terminal stages of their disease thereby making it difficult on the part of the certifying doctor to mention the time interval. There is a need to frame proper guidelines to define the time interval between the onset of a disease and the terminal event.

The cause of death is often confused with the mode of death. In our study, this confusion was evident in 26.49% of the filled death certificates. This is in contrast to the study by Agarwal et al.¹² wherein the lack of clarity between the terms “cause of death” and “mode of death” was seen alarmingly in 86% of the certificates. Another study conducted by El-Nour et al.¹³ in Sudan observed that 47% of certificates listed mode of death in place of cause of death. Cause of death includes any disease or injury responsible to initiate a chain of events incompatible with life resulting in the death of a person, whereas mode of death is the process of death and may be initiated by the failure of any of the three vital systems of the body. These differences are explicitly mentioned in textbooks and literature and are taught extensively in the 2nd MBBS curricula. Although the MCCD guideline specifically mentions that the cause of death should not be confused with the mode of death, it is disturbingly seen in a significant proportion of the certifying doctors.

In our study, the use of abbreviations was observed in 43.71% of the certificates which is higher than the study by Patel et al.¹⁴ who observed the same in 32.50% of cases. The handwriting was illegible in 52.32% of the certificates which is more than double of what was observed by Raje⁸ in their study, where 23% of their certificates did not have legible signature or name of doctor mentioned at the bottom of certificate. Similar findings were reported from a pediatric hospital in Sudan where 18% of certificates were not signed by doctors.¹³ Fear of legal entanglements in the event of identifiable signatures may be a cause for the deliberate avoidance of signature and name. Myriad reasons are responsible for the incomplete documentation of the death certificate. There is ignorance of legal implications of certification on the part of the physician. Demand

Table 5
Frequency of use of abbreviations & legibility of handwriting.

Total number of cases studied ($n = 151$)	No. of cases	Percentage ($n = 151$)
Use of abbreviation	66	43.71%
Illegible handwriting	79	52.32%

by the patients' attendants for quick handover of the mortal remains of the deceased coupled with an attempt to avoid the uncomfortable situation of confronting the relatives to explain the unfortunate occurrence of death by the junior doctors belittles the importance of careful documentation of events in the death certificate. Moreover, the inaccuracy in certification of the cause of death may arise out of lack of awareness of the legal process (requirements). Most doctors qualify with little or no formal training in death certification, while others may be inexperienced or have had insufficient exposure. Lack of sensitization and understanding of the doctors regarding the importance of medical certificate of cause of death in mortality statistics for epidemiology, public health policy and research also manifest as improper documentation of the death certificate. Various studies have reported that sensitization and education can improve the accuracy of death certificate completion and reduce major and minor error rates in the cause of death section.^{5,15,16} It is also observed that a medical officer issuing one inaccurate certificate is more likely to issue another one. Poor documentation might be another reason for the incomplete and inaccurate certification as it says "what has not been documented in the notes has not happened" has to be applied.

In view of the lacunae in reporting observed in our study we feel that certain changes in the existing MCCD form can improve the accuracy of death reporting. The form should be made available in both print and electronic formats. A written instruction on the top of the form for mandatory filling up of all the areas can reduce the incidence of unintentional omission of data. Incorporation of software which ensues compulsory filling up of all data for successful submission of the electronic version of the form will curtail the practice of intentional under reporting.

5. Conclusion

Medical certificate of death is an important aspect of documentation following the death of an individual. It is a legal as well as ethical responsibility of the doctor to issue medical certificate of cause of death based on International Classification of Diseases. A lot of perplexity exists in the minds of medical fraternity about the correct way of filling the certificate of death. In our study of only 151 cases the results highlight that most of the certificates were inaccurate and incomplete because of avoidable errors. To minimize these lacunae, the 'attitude' and 'skill' of the physicians need to be improved. A sincere effort is required to create awareness regarding importance of complete and accurate filling of the forms. Regular death review meetings involving senior members as well as multiple departments are the simplest way to improve the awareness about the proper certification of cause of death. Certification should never be left to the junior most member of the team particularly during the emergency hours. As a routine process, proper documentation and death certification should be demonstrated to them by the senior registrar on duty so that they can be trained at an early stage and sensitized to its importance vis-à-vis legal, ethical, social and health-related implications. Instead of single doctor certification, a team of doctors should verify the certificate. During routine hours, certificates should be cross-checked by a senior faculty member who was responsible for the care of the deceased patient. If required, all death certificates

should be subjected to supervision. A concerted effort by all the stake holders of health care delivery system is required to seriously address this issue. If this is not done, medical certification will be defeated in its purpose of being the most important tool to obtain scientific and reliable information in terms of the causes of mortality.

Ethical approval

Ethical clearance was obtained from the institutional ethical committee.

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Conflict of interest

Nil declared.

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